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statement that, with Widman, + meant simply "und" (and) is correct as a description of Widman's general usage. There is just one exception. Once, but only once, does Widman in his book identify + with "meer" (mehr). It is in the passage quoted by Dr. Halsted, "was auss — ist, das ist minus . . . vnd das + das ist meer." It occurs in the explanation of a small table of weights.

Widman does not use the word "plus"; his word for addition is "vnd." As stated before, with Widman + had not yet become a purely mathematical sign. In his arithmetic (1489), as well as in a manuscript algebra in Latin, which he owned, + is used for "vnd" or "et" even in cases where "vnd" or "et" do not mean addition, as in the heading, "Regula augmenti + decrementi." It is interesting to note that he uses the word "minus" only twice in his book, and only once in the sense of —. Hence, in Widman, the words "plus" and "minus" do not occur as ordinary terms for addition and subtraction. The symbol + is often used for addition; — is used for subtraction at times, but not regularly. Apparently, the regular association of + with "plus," and — with "minus," came after Widman.

A further study of manuscripts and early printed books may throw more light upon the origin of + and — (as well as upon the first use of the decimal point), but the evidence now at hand goes against Dr. Halsted's claim that the + and —, used in the sense of $\pi = 3.14 +$ and $\pi = 3.1416 -$, "is historically the first meaning of the signs + and —, which arose from the marks chalked on chests of goods in German warehouses, to denote excess or defect from some standard weight." That they were so used is not denied, but the facts do not warrant the categorical statement that this "is historically the first meaning." No evidence has been adduced to establish the early use of + and — as marks chalked on chests. In the *Bamberger Rechenbuch* (1483) the tare to be deduced from the gross weight of a package is called "Das Minus," but the symbol — is not used. On the other hand, the regular connection of + with "vnd" in

Widman's book of 1489 is unmistakable; the resemblance of + with the "et" of Latin manuscripts of the fourteenth and fifteenth centuries rests upon independent paleographic researches carried on by several writers mentioned by Cantor and Tropfke.

FLORIAN CAJORI

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AN INSTITUTE FOR BIBLIOGRAPHICAL RESEARCH

THE writer has from time to time tried to interest librarians, bibliographers and men of science in the matter of bibliographical research and publication, or rather in organized work along these lines, in the hope that a concerted movement in its favor might be brought about—but in vain. Men of wealth have also been approached, but so far the man who would see his opportunity and endow this important work has not been found.

An effort is now being made to interest business men in the subject. Special emphasis has lately been laid on the value of an institution for the organization of bibliographical research in the interest of agriculture, manufacture and commerce. A prospectus has been sent out to a number of business men in Chicago calling attention to the value of research along these lines for both agriculture, manufacture and commerce. A "Committee on Research Institute" has been formed for the purpose of promoting the idea.

While the latest endeavor has been made along the line of business, the intention of the writer is now, as it has always been, that the only limits to the scope of the proposed institute should be the actual needs of those who might seek its assistance. The functions of the proposed research institute would be entirely practical. The institute staff would be in readiness to make researches into definite subjects at the request of those desiring special information; it would also try to anticipate the needs of inquirers and compile references on subjects of actual interest in advance of demand.

It has been estimated that a sum of \$50,000, or a guaranteed income of \$10,000 a year for five years, would place the institute on a basis

firm enough to promise permanency. The institute would, it is expected, soon become in part self-supporting.

The writer has often been asked what relation this proposed bibliographical institute would have to the other institutes of this kind, notably the Institut International de Bibliographie at Brussels, and the Internationales Institut für Sozialbibliographie, and allied institutions, at Berlin. The answer is that it would supplement them and, as far as possible, utilize their material. The Brussels institute collects titles of all kinds, from all sources and of all dates, the Berlin institutes collect titles from the current year on a limited number of sciences. The institute which the writer proposes would have for its object to collect titles from all sources and of all dates on a definite number of subjects, concerning which information is actually wanted.

If anybody who reads the above should be willing to assist in any way in furthering the interest of bibliographical research along the lines suggested, he should communicate with the undersigned.

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SCIENTIFIC BOOKS

Elements of Physics. By E. H. HALL. Henry Holt & Co. Pp. 570.

A First Course in Physics. By MILLIKAN and GALE. Revised version. Ginn & Co. Pp. 430.

Applied Physics for Secondary Schools. By V. D. HAWKINS. Longmans, Green & Co. Pp. 196.

In a new text which may be looked on as a successor to Hall and Bergen's "Textbook of Physics," Professor Hall has incorporated many changes which have been suggested by discussions carried on in SCIENCE and in meetings of the American Association for the Advancement of Science. These changes are seen in the arrangement and treatment of mechanics and they tend toward the simpli-

fication of that subject. Mechanics is treated more fully in this text than in other elementary texts. The author has attempted to make the subject of the text deal with the experiences of the every-day life of the student. He has done this without introducing material and illustrations intended to make the book self-advertising, material which now figures in a number of texts. For this the text is to be commended.

The criticisms which many teachers will make are: that the text is much too full of details, that general principles do not stand out, and that the treatment is at times too didactic. How many students beginning physics are apt to understand or become enthused over this sentence on page 401, "Two conductors are said to be at the same electrical potential when the potential energy of a quantity of electricity on one is just as great as the potential energy of an equal quantity of electricity on the other, so that there is no flow of electricity from one to the other when they are connected by a conductor"? This is an unnecessarily heavy statement.

In attempting to bring in matter connected with the every-day life of the student the text has been burdened with detail. Its five hundred and seventy pages (seventy of which deal with laboratory exercises) may be regarded as encyclopedic for an elementary student.

The well-known and widely-used elementary text by Millikan and Gale has been revised, shortened by sixty pages, and improved in treatment. It is still, in its numerous details, a comprehensive text for elementary students, but it is interesting, original and up to date in subject matter. The authors aim to do away with the didactic method, yet in some of their abbreviated statements of general principles they do not accomplish this aim. To give only one example; in the deduction of the formula giving the object distance and image distance from a lens, they are content to state that a lens changes the curvature of a wave-front always by the same amount. This statement must appear an arbitrary one to a student, but had it been led up to by a